

WHAT IS CLAIMED IS:

1. An element comprising a support on which is disposed an organic electroconductive polymeric layer containing a conductive polymer such that when a printing solution containing a conductivity enhancing agent contacts said electroconductive layer, the resistivity of the areas that are contacted with the printing solution decreases by at least a factor of 10.
2. The element of claim 1 wherein the resistivity of the areas that are contacted with the printing solution decreases by at least a factor of 1000.
3. The element of claim 1 wherein the resistivity of the areas that are contacted with the printing solution decreases by at least a factor of 100.
4. The element of claim 1 wherein the conductivity enhancing agent is an organic compound containing dihydroxy, poly-hydroxy, carboxyl, amide, or lactam groups.
5. The element of claim 4 wherein the organic compound containing dihydroxy, poly-hydroxy, carboxyl, amide, or lactam groups is:
 - (a) represented by the following Formula II:
$$(OH)_n-R-(COX)_m$$

II

wherein m and n are independently an integer of from 1 to 20, R is an alkylene group having 2 to 20 carbon atoms, an arylene group having 6 to 14 carbon atoms in the arylene chain, a pyran group, or a furan group, and X is -OH or -NYZ, wherein Y and Z are independently hydrogen or an alkyl group; or
 - (b) a sugar, sugar derivative, polyalkylene glycol, or glycerol compound; or
 - (c) selected from the group consisting of N-methylpyrrolidone, pyrrolidone, caprolactam, N-methyl caprolactam, or N-octylpyrrolidone.

6. The element of claim 1 wherein said conductivity enhancing agent is a N-methylpyrrolidone, pyrrolidone, caprolactam, N-methylcaprolactam, N-octylpyrrolidone, sucrose, glucose, fructose, lactose, sugar alcohol, 2-furan carboxylic acid, 3-furan carboxylic acid, sorbitol, glycol, ethylene glycol, glycerol, diethylene glycol, or triethylene glycol, or a mixture of any two or more of these compounds.

7. The element of claim 1 wherein said conductivity enhancing agent is N-methylpyrrolidone, pyrrolidone, caprolactam, N-methyl caprolactam, or N-octylpyrrolidone.

8. The element of claim 1 wherein said conductivity enhancing agent is ethylene glycol, diethylene glycol or glycerol.

9. The element of claim 1 wherein said neutral-charge conductivity enhancer is a mixture of ethylene glycol, glycol or glycerol.

10. The element of claim 1 wherein said conductivity enhancing agent is one or more than one compound selected from the group consisting of N-methylpyrrolidone, sorbitol, ethylene glycol, glycerol, and diethylene glycol.

11. The element of claim 5, wherein n and m independently of one another denote an integer from 2 to 8.

12. The element of claim 4 wherein the organic compound containing lactam groups is N-methylpyrrolidone, pyrrolidone, caprolactam, N-methylcaprolactam, or N-octylpyrrolidone.

13. The element of claim 5 wherein the conductivity enhancing agent is sucrose, glucose, fructose, lactose, sorbitol, mannitol, 2-furancarboxylic acid, 3-furancarboxylic acid, ethylene glycol, glycerol, di- or triethylene glycol.

14. The element of claim 1 wherein the concentration of conductivity enhancing agent in the printing solution is 0.5 to 25.0 wt %, based on the weight of the printing solution.

15. The element of claim 1 wherein the concentration of conductivity enhancing agent in the printing solution is 0.5 to 10.0 wt %, based on the weight of the printing solution.

16. The element of claim 1 wherein the concentration of conductivity enhancing agent in the printing solution is 0.5 to 5.0 wt %, based on the weight of the printing solution.

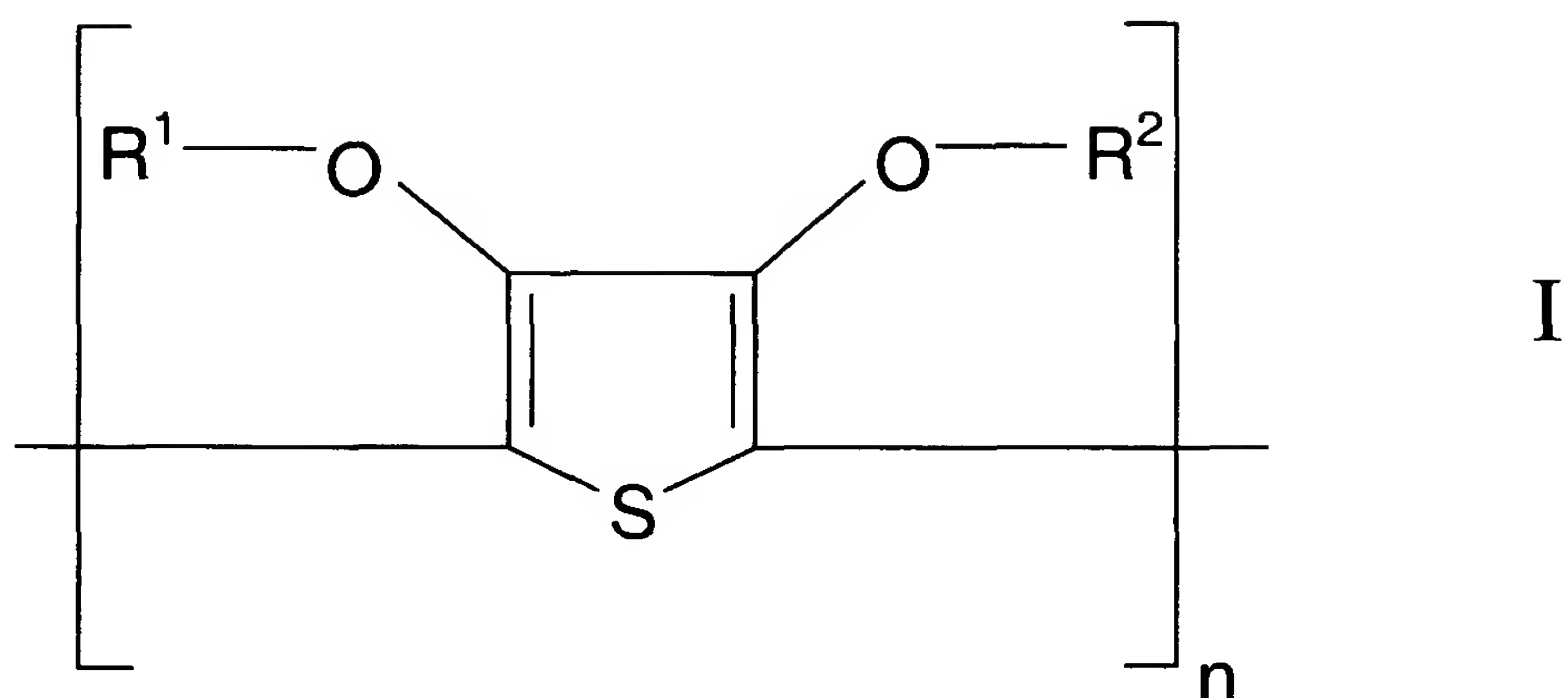
17. The element of claim 1 wherein the conductive polymer is a substituted or unsubstituted pyrrole-containing polymer, a substituted or unsubstituted thiophene-containing polymer, or a substituted or unsubstituted aniline-containing polymer.

18. The element of claim 1 wherein the layer containing the conductive polymer contains 10 to 1000 mg/m² dry coating weight of the conductive polymer.

19. The element of claim 1 wherein the layer containing the conductive polymer contains 20 to 500 mg/m² dry coating weight of the conductive polymer.

20. The element of claim 1 wherein the layer containing the conductive polymer comprises a mixture containing:

a) a polythiophene according to Formula I;



wherein each of R¹ and R² independently represents hydrogen or a C1-C4 alkyl group or together represent an optionally substituted C1-C4 alkylene group or a cycloalkylene group, preferably an ethylene group, an optionally alkyl-substituted methylene group, an optionally C1-C12 alkyl- or phenyl-substituted 1,2-ethylene group, a 1,3-propylene group or a 1,2-cyclohexylene group and n is 5-1000;

b) a polyanion compound; and, optionally

c) a film forming polymeric binder.

21. The element of claim 20 wherein the polyanion is an anion of a polymeric carboxylic acid.

22. The element of claim 20 wherein the polyanion is a polyacrylic acid, a poly(methacrylic acid), a poly(maleic acid), or a polymeric sulfonic acid.

23. The element of claim 20 wherein the polyanion is a polystyrenesulfonic acid or a polyvinylsulfonic acid.

24. The element of claim 20 wherein the film-forming polymeric binder comprises from 5 to 95 wt% of the layer containing the conductive polymer.

25. The element of claim 20 wherein the film-forming polymeric binder is selected from the group consisting of water-soluble or water-dispersible hydrophilic polymers, maleic acid or maleic anhydride copolymers, cellulose derivatives, polyvinyl alcohol, and poly-N-vinylpyrrolidone.

26. The element of claim 20 wherein the film-forming polymeric binder is gelatin or gelatin derivatives.

27. The element of claim 20 wherein the film-forming polymeric binder is carboxymethyl cellulose, hydroxyethyl cellulose, cellulose acetate butyrate, diacetyl cellulose, or triacetyl cellulose.

28. The element of claim 20 wherein the film-forming polymeric binder is an aqueous emulsion of addition-type homopolymers and copolymers prepared from ethylenically unsaturated monomers.

29. The element of claim 28 wherein the monomers are selected from the group consisting of acrylates, methacrylates, acrylamides, methacrylamides, itaconic acid and its half-esters and diesters, substituted and unsubstituted styrenes, acrylonitrile, methacrylonitrile, vinyl acetates, vinyl ethers, vinyl and vinylidene halides, and olefins.

30. The element of claim 20 wherein the film-forming polymeric binder is an aqueous dispersion of polyurethanes or polyesterionomers.

31. The element of claim 20 on which an electrode pattern is made by offset printing, screen-printing or ink-jet printing.

32. The element of claim 1 wherein the conductive layer is applied using spin coating, hopper coating, roller coating, or air knife coating.

33. The element of claim 1 wherein the support is transparent, opaque, or reflective.

34. The element of claim 1 wherein the support is glass, a polymeric film, paper, silicon wafers, or glass reinforced epoxy.

35. The element of claim 34 wherein the polymeric film support is polyester, polycarbonate, polystyrene, cellulose esters, or polyolefins.

36. A method for producing an electrode pattern on a support comprising a conductive polymer, the method comprising the steps of :
applying to the support a layer containing a conductive polymer;
and
printing on said support a pattern using a printing solution containing a conductivity enhancing agent such that the resistivity of the areas that are contacted with the printing solution decreases by at least a factor of 10.

37. The method of claim 36 wherein the resistivity of the areas that are contacted with the printing solution decreases by at least a factor of 1000.

38. The method of claim 36 wherein the resistivity of the areas that are contacted with the printing solution decreases by at least a factor of 100.

39. The method of claim 36 wherein the electrode pattern is made by offset printing, screen-printing or ink-jet printing.

40. The method of claim 36 wherein the conductive layer is applied using spin coating, hopper coating, roller coating, or air knife coating.

41. The element of claim 20 wherein said polyanion is polystyrene sulfonic acid.